

Tantalum ${}_{73}\text{Ta}^{180.948}$

Discovered in 1802 by A.G. Ekeberg at Uppsala, Sweden.

[Greek, Tantalos, father of Niobe of Greek mythology]

French: tantale

German: tantal

Italian: tantalio

Spanish: tántalo



Atomic number	73
Density in g/cm ³	16.654
Atomic radius in pm	200
Atomic weight	180.95
Melting point in °C	2996
Boiling point in °C	5425

Description: Tantalum is a shiny, silvery metal which is soft when pure. It is very resistant to corrosion due to an oxide film on its surface, but is attacked by HF and molten alkalis. Tantalum is used in electronics, cutting tools, chemical plants and surgery.

TANTALUM SINGLE CRYSTAL PROPERTIES

State:	Single crystal
Crystal structure:	bcc
Production method:	Floating zone
Standard size:	diameter 6-12mm thickness 1-2mm
Orientation:	(100), (110) and (111)
Orientation accuracy:	<2°, <1°, <0.4° or <0.1°
Polishing:	as cut, one or two sides polished
Roughness of surface:	<0.03µm
Purity:	99.99%
	C 3
	H < 1
	O 9
	N < 5
	Cu 1.60
	Fe 1.80
	Ni < 1
	Pb 0.30
	Si 0.30
	Ga, Hf and Ta are below the detection limit
Density:	16.6 g/cm ³
Melting point:	2995.85 °C / 3269 °K
Boiling point:	5424.85±100 °C / 5698±100 °K
Molar volume:	10.87 cm ³
Thermal conductivity:	57.5 [300 K] Wm ⁻¹ K ⁻¹

Typical analysis (ppm):

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Coefficient of linear thermal expansion:	6.6 x 10 ⁻⁶ K ⁻¹
Electrical resistivity:	12.45x 10 ⁻⁸ [298 K] Wm
Mass magnetic susceptibility:	+1.07 x 10 ⁻⁸ (s) kg ⁻¹ m ³
Young's modulus:	185.7 GPa
Rigidity modulus:	69.2 GPa
Bulk modulus:	196.3 GPa
Poisson's ratio:	0.342
Radii:	Ta ⁵⁺ 64; Ta ⁴⁺ 68; Ta ³⁺ 72; atomic 143; covalent 13
Electronegativity:	1.5 (Pauling); 1.33 (Allred); 4.11 eV (absolute)
Effective nuclear charge:	3.30 (Slater); 9.53 (Clementi); 13.78 (Froese-Fischer)
Number of Isotopes (incl. nuclear isomers):	28
Isotope mass range:	159 -> 186
Crystal structure, (cell dimensions / pm), space group	bcc
X-ray diffraction: mass absorption coefficients:	CuK α 166 (μ/r) / cm ² g ⁻¹ MoK α 95.4 (μ/r) / cm ² g ⁻¹
Neutron scattering length:	0.691 b/10 ⁻¹² cm
Thermal neutron capture cross-section:	20.6 sa / barns

